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APPLICATION NUMBER: 60/503,708  
FILING DATE: *September 17, 2003*

Certified by



Jon W Dudas

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09/17/03

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# PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53 (c).

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☒ Additional inventors are being named on the ONE separately numbered sheets attached hereto

TITLE OF THE INVENTION (280 characters max)

TELESCOPING TABLE

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ENCLOSED APPLICATION PARTS (check all that apply)

☒ Specification Number of Pages 12 ☐ CD(s), Number

☒ Drawing(s) Number of Sheets  ☐ Other (specify)

☒ Application Data Sheet. See 37 CFR 1.76

METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT (check one)

☐ Applicant claims small entity status. See 37 CFR 1.27.

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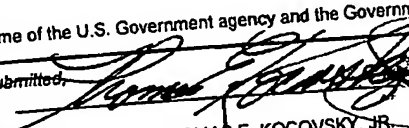
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The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

☐ No.

☒ Yes, the name of the U.S. Government agency and the Government contract number are: \_\_\_\_\_

Respectfully submitted,  Date 09/17/2003

SIGNATURE THOMAS E. KOCOVSKY, JR. (if appropriate)

TYPED or PRINTED NAME THOMAS E. KOCOVSKY, JR. Docket Number: 28,383

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*Additional Page*

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Number ONE of ONE

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## TELESCOPING TABLE

The recent trend in medical diagnostic imaging is to image patients with two different imaging modalities, e.g., CT and nuclear medicine. To do this, imagers for the two modalities are positioned stationarily one in back of the other. The patient table is positioned at one end and the patient table must extend far  
5 enough to move the patient through the bore of both imagers.

The present application describes a telescoping patient table which can provide full body examinations from both imaging modalities.

As with reference to the Figures, the patient table includes a main support 10 which is positioned adjacent and in line with the bores of a first imaging  
10 device 12 and a second imaging device 14. The table includes a patient pallet 16 which is supported only at a far end 18 of the patient pallet from the imagers 12 and 14 on an intermediate pallet 20. The patient pallet is cantilevered a short distance above the intermediate pallet and preferably sloped upward slightly such that a patient of average weight returns the pallet to a level and horizontal  
15 orientation, still cantilevered above the intermediate pallet.

With reference to Figures 2 and 3, to image with the first modality 12, the intermediate pallet 20 is either held in the fully retracted position or, as illustrated most clearly in Figure 3, extended a short, but fixed distance from the main support 10. The patient pallet 16 is then moved on the intermediate pallet as  
20 is appropriate to the imaging procedure to position a region of interest in the bore of the first modality 12 or through the imaging region. The cantilevered portion of the pallet beyond the intermediate pallet is at least 190 cm such that the entire patient is supported on the cantilevered portion of the patient pallet. This permits a whole body scan to be conducted with the first imaging modality.

25 To image with the second imaging modality, the patient pallet is retracted (Figure 2) onto the intermediate pallet. Then, as illustrated in Figure 4, the intermediate pallet 20 with the patient pallet in the fully retracted position is extended through the bore of the first modality 12 until it is above an intermediate support or catcher lift 22. Because the patient pallet is mounted to the far back of

the intermediate pallet only, and above a region that is supported by the main support, the intermediate pallet carries substantially no load other than its own weight during this process. Although the intermediate support could have a fixed height due to this lack of deflection as the intermediate pallet extends, the intermediate support is preferably adjustable to accommodate adjustments in the height of the main support to accommodate patients of larger and smaller girth. Once the intermediate pallet is over the intermediate support and extending beyond the support point by the same distance as the intermediate table extended beyond the main support during imaging by the first modality, the intermediate support is raised until it just touches the intermediate pallet. Thereafter, the patient pallet is moved back and forth on the intermediate pallet as is appropriate to the imaging procedure selected to image the patient in the scanner 14 of the second imaging modality. Because the intermediate pallet is positioned outside of the bore of the second imaging modality, and because the patient pallet extends a full body length, a full body scan of the patient can be made with the second imaging modality. Of course, smaller areas, as may be selected, can also be imaged.

Once the intermediate pallet is in the fully extended position (Figure 5) and supported by the intermediate support, only then is the patient pallet released to move. In the case of a power failure, the drive screw which drives the patient pallet has a sufficiently steep pitch that the operator can move the patient pallet back and forth on the intermediate pallet manually. This enables the operator in a power failure or other emergency to push the patient pallet from the fully extended position of Figure 5 back to the position of Figure 4.

To assure that the operator movement of the patient pallet does not also move the intermediate pallet while the patient pallet is still cantilevered beyond it, a locking mechanism as illustrated in Figure 6 locks the intermediate pallet against movement until the patient pallet is in its fully retracted position. Once the patient pallet is in its fully retracted position, then the lock is released and continued manual force by the operator can retract the intermediate pallet as well.

In the embodiment of Figure 6, when the patient pallet is extended, a lever arm 3 is biased to rotate clockwise, moving a lever 9 into engagement with a sprocket 8 on the lead screw which drives the intermediate pallet. The lead screw

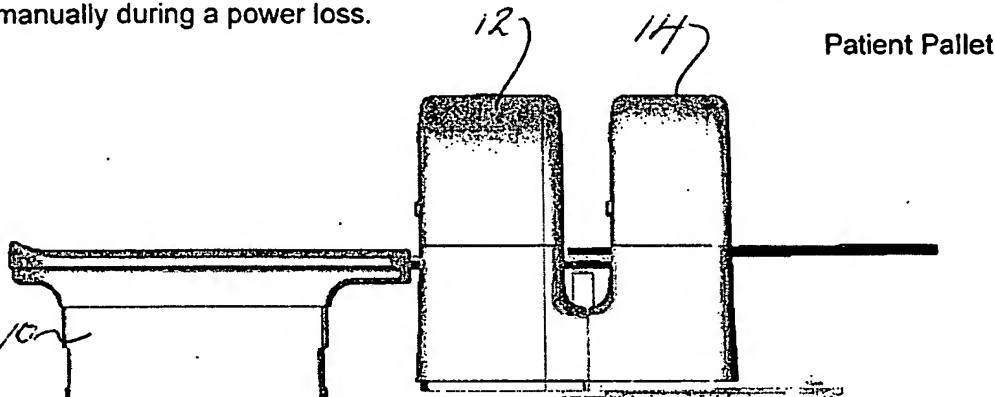
of the intermediate pallet is again of a sufficiently steep pitch that the intermediate pallet can be pushed manually rearward with a reasonably small amount of force, e.g., 30 lbs. However, with the lever in the sprocket, the lead screw is prevented from rotating, thus preventing the intermediate pallet from being moved. As the  
5 patient pallet approaches its fully retracted position, a latch 4 cams the lever 3 counter-clockwise, lifting the lever 9 and releasing it from the sprocket 8. The latch 4 engages the lever 3 to hold the patient pallet and the intermediate pallet together with the patient pallet in its fully retracted position. Continued force on the patient or intermediate pallet then moves the intermediate pallet back to its  
10 fully retracted position, at which point the patient can be unloaded.

The invention has been described with reference to the preferred embodiments. Modifications and alterations will occur to others upon a reading and understanding of the preceding detailed description. It is intended that the invention be construed as including all such modifications and alterations insofar  
15 as they come within the scope of the appended claims or the equivalents thereof.

**CLAIMS:**

Having thus described the preferred embodiments, the invention is now claimed to be:

- 5                    1.     A telescoping patient table for facilitating dual modality imaging.

ID ABSTRACT			
ID-number: 704006	Client reference:	Patent Engineer: Eugene CLAIR	To be filled in by GS&S:
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Short title: Telescoping Table			
OS-codes: MS640C	MS480C	ID Date: 12 Dec. 02	
Project code:	Action code: 2	Action Code Date: 24 Feb 03	
ABSTRACT			
<p>This Telescoping Table is design to be used with, but not limited to, a dual modality imaging system. The table is composed of a patient pallet and an intermediate pallet. When the patient needs to be imaged by the second modality the intermediate pallet extends out allowing the patient pallet to reach it. A lifter supports the intermediate pallet when it is extended. A safety mechanism forces the two pallets to retract in a safe sequence if the pallets must be retracted manually during a power loss.</p>			
			
<p><b>Advantages / Improvements:</b>  The table telescopes thereby keeping the retracted length of the system to a minimum.  The telescoping feature also allows full body (&gt;190cm) imaging through both modalities.  The design of this table allows constant and equivalent deflection of the patient pallet when it moves through the first and second modality.</p>			
<p><b>Application / Use:</b>  Multi-Modality medical diagnostic imaging</p>			
<p><b>PE Remarks:</b></p>			
To be filled in by PE in case of AC 2			
Information is missing:	<input type="checkbox"/> Technical <input type="checkbox"/> Commercial		
Information will be provided by:	name of the person / priority setting meeting time limit <input type="checkbox"/> Inventor(s) <input type="checkbox"/> Priority setting meeting <input type="checkbox"/> Other person		
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Patent application to be outsourced:	<input type="checkbox"/> Yes <input type="checkbox"/> No If, Yes, preferred outside attorney:		
(Please return to local GS&S)			

Note: Some non-relevant components are hidden in all Figures.

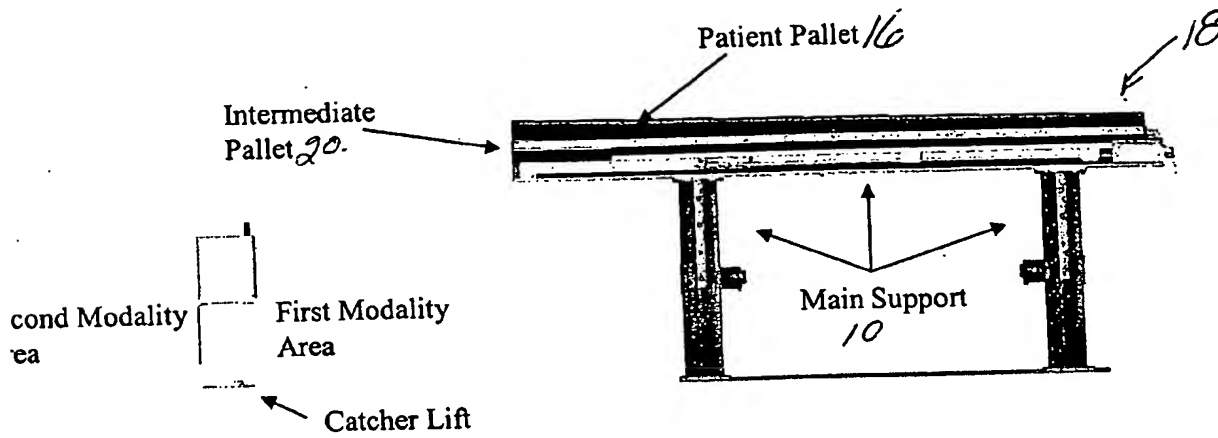


Figure 1: Gemini Table with pallets in collapsed position

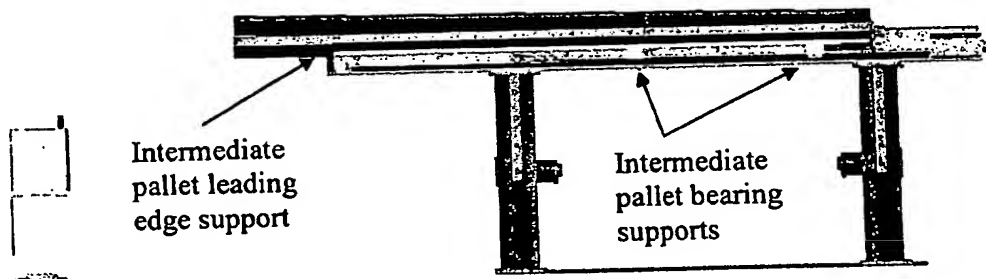


Figure 2: Gemini Table with Pallets in First Modality Start Position

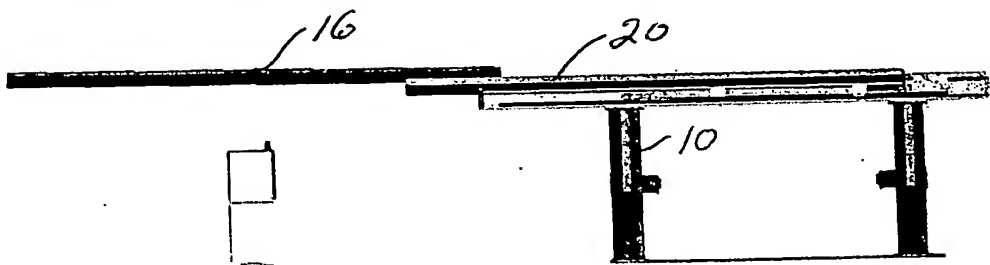
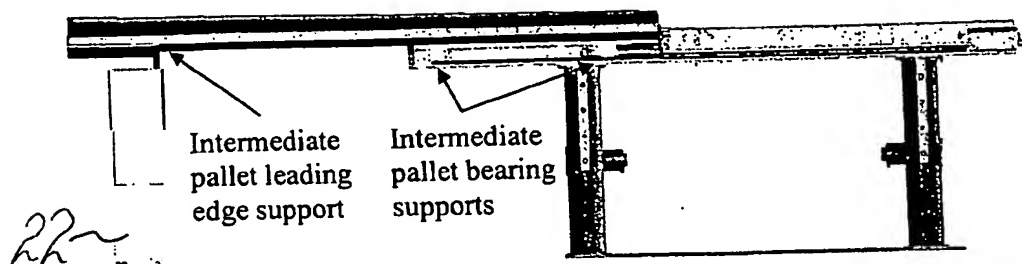


Figure 3: Gemini Table with Pallets in First Modality End Position



**Figure 4: Gemini Table with Pallets in Second Modality Start Position**



**Figure 5: Gemini Table with Pallets in Second Modality End Position**

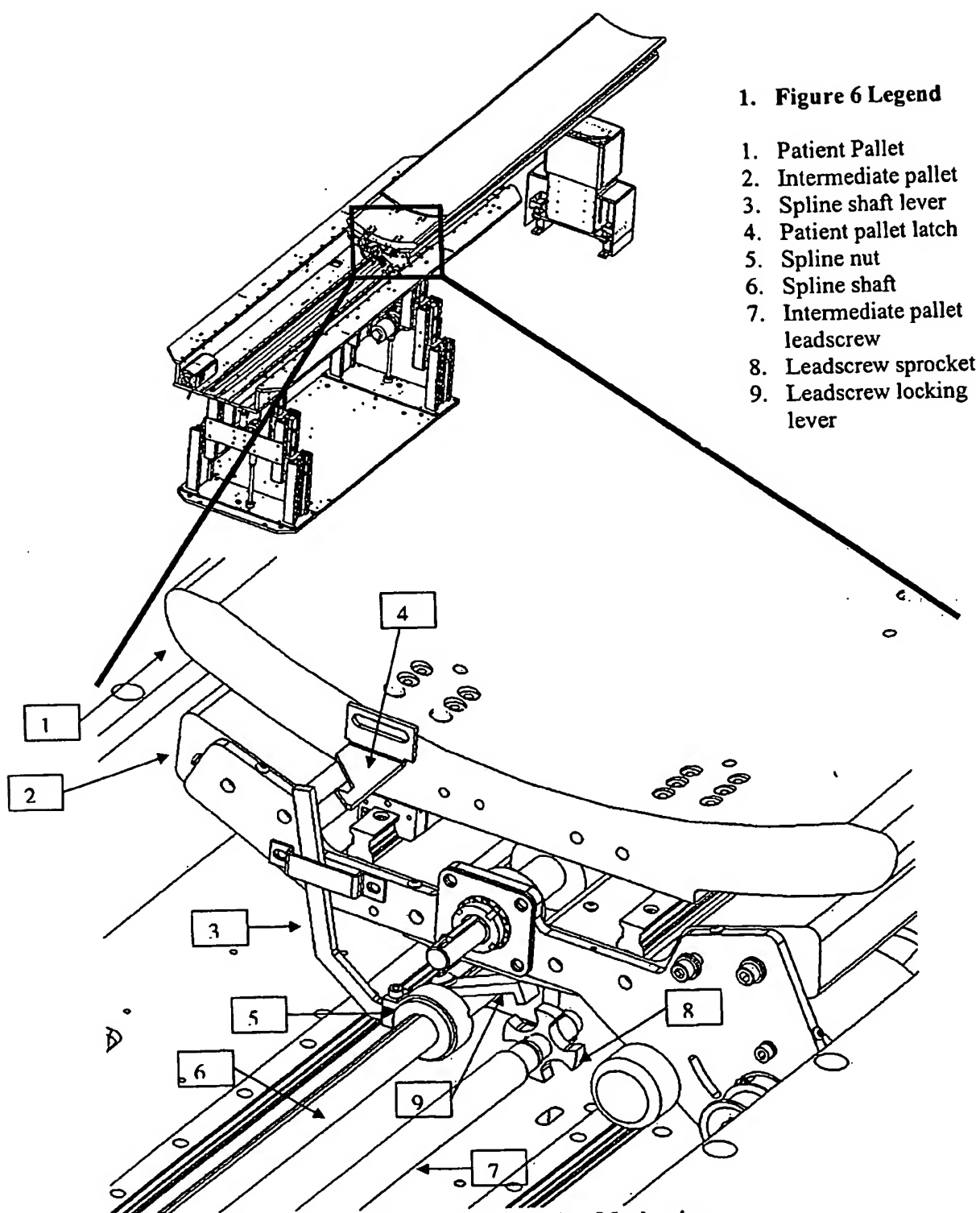


Figure 6: Extraction Mechanism

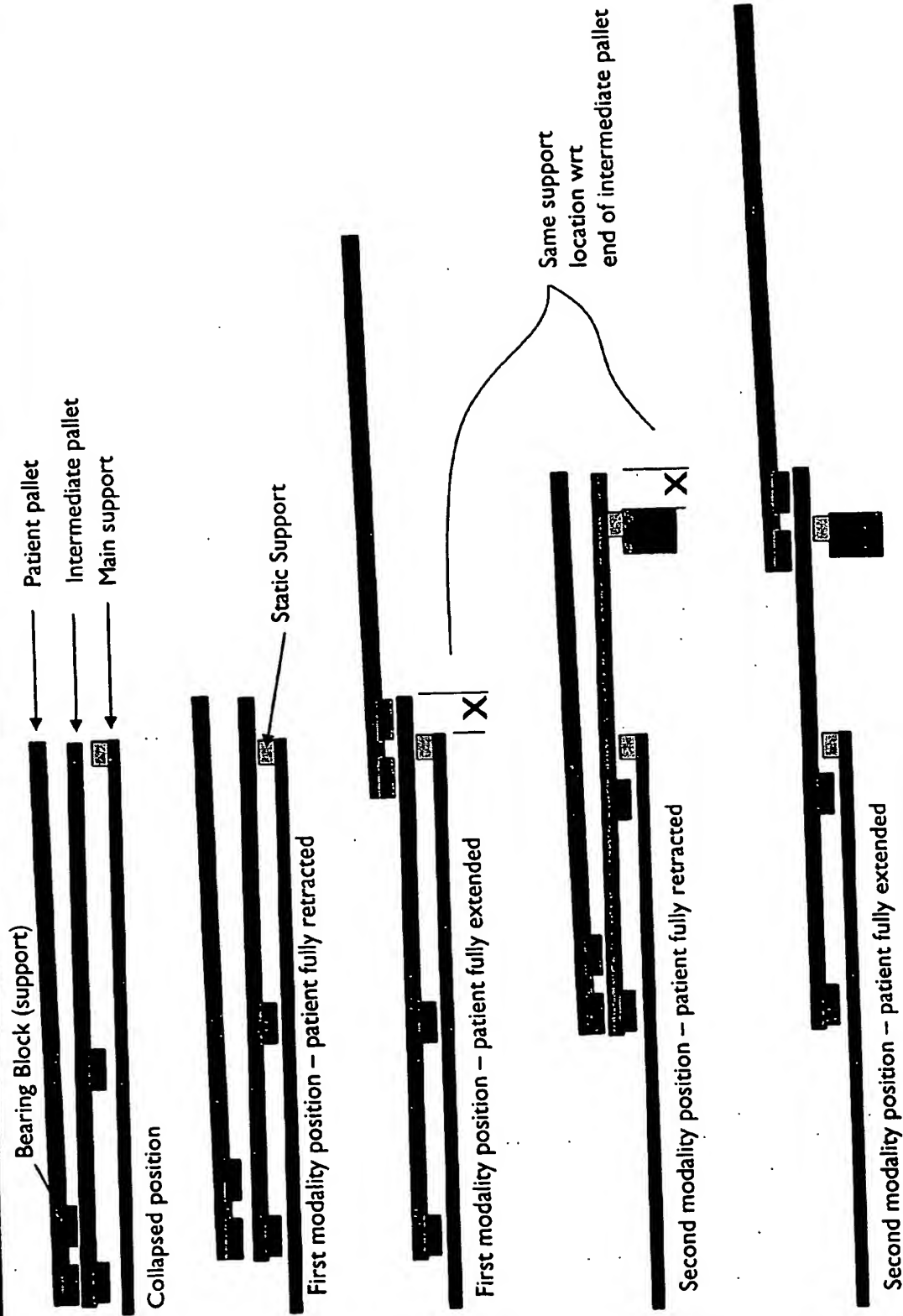
The Gemini Table has two unique features. The first is the ability to acquire images from two modalities, such as CT and PET or others, with one table using a pallet that has consistent deflection during imaging through both modalities. The table does this with a collapsed length equal to a single modality table. The second unique feature is the ability to safely extract the patient with the pallets during a total power loss. To manually move the patient out of the imaging area the pallets must be retracted in such a way that will not cause a hazard. This unique mechanical mechanism forces the pallets to be retracted in a safe sequence.

The basic components of the Gemini table are the main support, intermediate pallet, patient pallet and catcher lift (Figure 1).

1. Consistent deflection between modalities is achieved through the unique pallet mounting and support methodology. The patient pallet is fully cantilevered at all times. Only a 12-inch rear section is used for mounting the patient pallet to the intermediate pallet. The intermediate pallet is supported at the same three longitudinal locations relative to itself while imaging with either modality (Figures 2-5). Linear bearing blocks support the rear two locations at all times. The leading section of the intermediate pallet is supported by a fixed support located within the main support during imaging with the first modality. During imaging with the second modality, support is provided by a catcher lift situated after the first modality. The leading edge of the intermediate pallet is supported in the same location with respect to itself as when imaging the first modality, so that the deflection profile will stay consistent.

2. The emergency extraction mechanism uses a system of levers and other components to force the pallets to be retracted in a safe sequence. The patient pallet must be fully retracted before the intermediate pallet is retracted. If the intermediate pallet is allowed to move before the patient pallet is retracted it is possible the intermediate pallet would slide off the catcher lift. This would cause the intermediate pallet to be over loaded and cause a hazard to the patient and other users of the system.

During normal operation, power on, the extraction mechanism is held in an unlock position by a solenoid (not shown) connected to the spline shaft (6). During a loss of power the solenoid loses power and relaxes allowing the extraction mechanism to lock. A spring rotates the spline shaft and forces the leadscrew locking lever (9) to engage the leadscrew sprocket (8), locking the intermediate pallet leadscrew and keeping the intermediate pallet from moving. At this point the patient pallet is free to move. It can now be pulled to the fully retracted position. Approximately two inches before the patient pallet is fully retracted the patient pallet latch (4) latches onto the spline shaft lever (3) and keeps the patient pallet from moving back out to an extended position. At the same time the patient pallet latch (4) pushes on the spline shaft lever (3) forcing the spline shaft to rotate. As the spline shaft rotates it disengages the leadscrew locking lever (9) from the leadscrew sprocket (8). The intermediate pallet can now be retracted safely with the patient pallet locked in the fully retracted position. The spline shaft is needed to allow the spline shaft lever (3) to move longitudinally with the intermediate pallet.



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This Telescoping Table is design to be used with, but not limited to, a dual modality imaging system. The table is composed of a patient pallet and an intermediate pallet. When the patient needs to be imaged by the second modality the intermediate pallet extends out allowing the patient pallet to reach it. A lifter supports the intermediate pallet when it is extended. A safety mechanism forces the two pallets to retract in a safe sequence if the pallets must be retracted manually during a power loss.

5. **PRESENT STATE OF THE ART**

Briefly describe the closest already-known technology that relates to the invention. This would include, for example, already existing products, methods or compositions which are known to you personally or through descriptions in publications.

Discovery LS Table (GE) and Biograph Table (Siemens).

6. **ADVANCEMENT IN STATE OF THE ART**

Briefly describe the unique advancement achieved by the invention. This may be done, for example, by describing a problem with the prior art that is solved or specific objects that are achieved by the invention.

This telescoping table has many unique features:

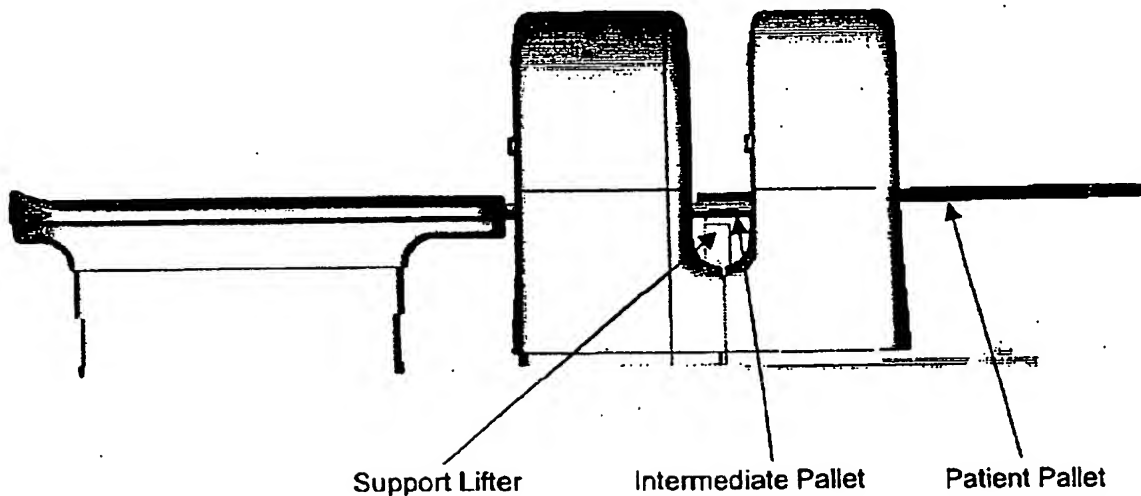
This table telescopes. This keeps the retracted length of the system to a minimum. The retracted length of this table is equivalent to the retracted length of a single modality system. This is significant because room size is often times a determining factor in whether or not a system can be installed into the hospital. The telescoping feature also allows full body (>190cm) imaging through both modalities.

The design of this table allows constant and equivalent deflection of the patient pallet when it moves through the first and second modality. This is significant because the images acquired by the two modalities will be merged. If the deflection is not constant and equivalent the two images will not line up.

This table is equipped with a safety mechanism that forces the two pallets to retract in a safe sequence if the pallets must be retracted manually during a power loss. Without this the intermediate pallet could be pulled off the lift support before it is unloaded and safe to do so.

Advancements in state of the art are:

1. Telescoping table with long reach (12 feet) and constant deflection.
2. During emergency and power loss retraction mechanism allows safe retraction sequence of patient and pallets. Anchoring forces are not exceeded as not to endanger patient or user.



**Figure 1: Telescoping Table Fully**

7. WHAT IS THE BEST WAY YOU KNOW OF TO IMPLEMENT THE INVENTION?  
Briefly describe the invention and how it achieves the advancement described in paragraph 7.

Prototype as been built and concept has been tested.

The top and intermediate pallets are made of very light, stiff carbon fiber. The primary support is an aluminum frame. A mechanism composed of leadscrews, linear rails, motors and other small components move the pallets horizontally and make up the manual retraction mechanism.

**APPLICATION DATA SHEET**

Mail Stop: Provisional Patent Application  
Commissioner for Patents  
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**Representative Information**

Registration Number:: 28,383

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Application Type::	Provisional
Docket Number::	PHUS030337USQ (704006)

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